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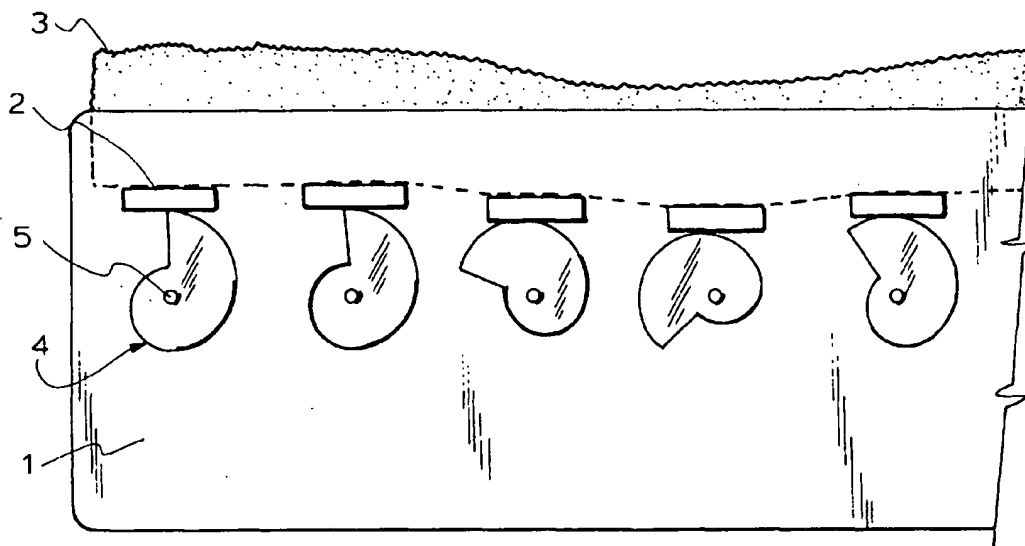
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(54) Title: IMPROVED SUPPORT BASE FOR A BED MATTRESS



(57) Abstract: A support base for a bed mattress (3) including a housing (1) having a plurality of transverse slats (2) for supporting said mattress wherein one or more of said slats are individually adjustable relative to said base to provide calibrated positive or negative height adjustment for each slat, characterized in that said height adjustment is provided by a means which is operable external to said housing.



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## Improved support base for a bed mattress

### Introduction to the Invention

This invention relates to bedding apparatus and in particular to an improved bed base for supporting an inner sprung or other mattress.

### 5 Background to the Invention

The combination of an upper mattress supported on a lower base forms a typical bedding apparatus in common use. The upper mattress can be of any type, composition or configuration to provide the necessary comfort and secondary support for the user. The lower base is used to elevate the  
10 mattress off the ground and to provide ventilation, but importantly to also provide controlled macro support for the upper mattress.

Macro support is important to give the mattress the correct and optimal overall support to suit the user's physique and orthopaedic requirements. The fine tuning or micro support of a bed is generally confined to the upper  
15 mattress which can be supplied in a range of hardnesses to suit the user. In addition, the upper mattress can be tailored to suit individual requirements with the provision of hybrid components to suit dual occupancy.

The correct and careful selection and adjustment of both the macro and micro support of a mattress is vital to achieve the optimal bedding  
20 support to suit the variety of user requirements which vary with the different physical and medical requirements of each individual.

To date, the ability of a bed base to provide adequate macro support has been limited by the crude systems available. Currently available base systems include innerspring bases and platform bases using transverse slats.  
25 While innerspring bases give the user an impression of "comfort" by feeling soft, this system provides minimal controlled macro support and results in a "bouncy feel" rather than adequate overall support for an upper mattress.

Platform bases also provide macro support but have limited adjustment potential even with the incorporation of double slats and firmness adjusters  
30 which allow individual slats to be adjusted to provide various degrees of flex

over the length of the slat. Such systems do little to provide the upper mattress with the necessary macro support to give the user's body optimal orthopaedic support. Double slats may provide variable flex giving rise to differential support but such slats only allow a deflection difference of up to about 15mm over a standard slat when under load. Adult human bodies may have shape differences between the shoulders and waist of up to perhaps 80 mm. Accordingly, the potential deflection compensation available from double slats is quite insufficient to cater for such variations in the end user. Furthermore, double slats do not provide an individual height adjustment for the slats but only an individual flex adjustment.

In order to provide a further level of macro adjustment, height adjustment of individual slats in a platform base would provide clear advantages. Whilst some prior art devices are known which provide slating adjustment for bed bases incorporating individual transverse slats, none of the known prior art devices provide a ready means of adjusting individual slats in a quantitative and calibrated manner so as to allow the user or a medical adviser a satisfactory means of making suitable adjustment to confidently meet an individual's particular requirements.

If such individual height adjustment could be provided and could be operated external to the bed base, a means of ready and convenient alteration of a bed's macro support would be achieved.

#### Statement of Invention

In one aspect, the invention provides a support base for a bed mattress including a housing having a plurality of transverse slats for supporting said mattress wherein one or more of said slats are individually adjustable relative to said housing to provide calibrated positive or negative height adjustment for each slat, characterised in that said height adjustment is provided by a means which is operable external to said housing. The height adjustment means may be (a) cams positioned at either end of a given slat, (b) elongate cams supporting the length of each slat, (c) general height adjusting blocks,

or (d) height adjusting blocks calibrated to a height adjustment scale shared by other means for height adjustment, such as cams. If the elongate cams are made of suitable diameter the slats can be eliminated with the bed mattress supported directly on the cams, which function as slats.

5       Accordingly, in another aspect the invention provides a support base for a bed mattress including a housing having a plurality of transverse elongate cams for supporting said mattress and an adjustment means for said cams wherein one or more of said cams are individually adjustable relative to said housing to provide height calibrated adjustment for said bed mattress.

10       Preferably said height adjustment means is provided by a means which is operable external to said housing.

          The cams may be fixed to a common axle which protrudes outside the housing to provide the external access to said height adjustment means. The cams may also be provided with calibrations to provide quantitative data on  
15       the amount of adjustment occurring. Handles or other fittings may be used to operate the height adjustment means.

          The adjustment can be either totally individual from one height adjustment means to the next, or may be coordinated between height adjustment means to provide rapid adjustment.

20       The height adjustment may also be achieved by "general" height adjusting blocks or may be faithfully duplicated by the use of height adjusting blocks corresponding to the cam calibrations.

          The support base may be adapted for a range of bed sizes including single, double and larger sizes. The adjustment means can be coordinated for  
25       both sides of a multiple user bed or separate systems incorporated in either side.

          In another aspect the invention provides a support base for a bed mattress wherein said support base housing has a hinged portion adapted for raising to support the user in a partially upright position wherein the  
30       raiseable portion of said housing incorporates one or more transverse slats or transverse elongate cams for supporting said mattress wherein the slats or

cams are individually adjustable relative to said housing to provide local adjustment of said mattress wherein said adjustment is provided by a means which is operable external to said housing.

5 The invention will now be described with reference to the following figures.

Figure 1 shows a partial side view of the support base.

Figure 2 shows a full side view of the support base without mattress fitted.

10 Figure 2a shows the positive and negative slat adjustment using height adjustment blocks.

Figure 2b shows a calibrated cam and corresponding height blocks.

Figure 3 shows a plan view of the support base featuring cam adjustment.

15 Figure 4 shows the end view of an eccentrically mounted elongate cam.

Figure 5 shows a perspective view of a support base incorporating a plurality of elongate cams.

Figure 6 shows a hospital or invalid bed incorporating the variable support features in the lumbar region.

20

#### Detailed Description of the Invention

Referring firstly to Figure 1 where a partial side view is shown of the mattress support of the invention. The mattress support is in the form of a support base adapted for supporting a bed mattress over the substantial  
25 underneath region of the mattress. The housing will generally take the form of a rectangular or square unit substantially shaped to correspond to the relevant sized mattress including single, double, queen, king etc. The mattress is supported on the top region of the housing by way of a plurality of transverse supporting slats 2 which are positioned within the housing 1 so  
30 as to provide the support for the mattress 3. The slats 2 are individually adjustable so as to provide varying heights relative to the housing 1. Each

slat is provided with an adjustable cam 4 at either end rotating about an axle 5. The cam 4 cooperates with the supporting slats 2 such that by rotation around the axle 5 allows for the movement of the slat up or down so as to provide the required height for the individual slat.

5        Figure 2 shows a side view of the support base of the invention where the housing 1 accommodates a plurality of slats 2 along the length of the housing for full and total support of the mattress (not shown). The cams 4 are operable by rotating the axle 5 which can be accessed from the exterior of the housing by way of either protruding handles which can be rotated or  
10        alternatively the axles can be accessed with an appropriate tool.

Figure 2a shows the support base where the slats have been lowered in region 10 by activation of said cams, to accommodate the hip or shoulder region of the user. If using calibrated height adjustment blocks, this setting would correspond to a cam reading of -2 (-3 from the support and +1 from  
15        the block). In region 11 the cams have been raised to accommodate the waist or neck region of the user corresponding to a cam reading of +2 and +1 for the slats shown.

The calibrated cam is shown in Figure 2b where rotation of the cam by a given amount will provide a measure of height adjustment. The cam has  
20        calibrations corresponding to linear amounts of lift or drop; for example 5mm per increment. This calibrated adjustment allows the user to make adjustments in an informed and methodical manner. Moreover, the adjustment up or down by way of the cams can be faithfully replicated in other beds by using blocks 10 which correspond to the movements of the  
25        cam in other bases. In this manner, the base of the invention, incorporating the cams, can be used by a medical practitioner to measure the patient and determine the adjustments needed and the patient can be supplied with the corresponding array of lifting blocks for installation in their home bed. In this way the more complex cam unit can be used by a selection of  
30        practitioners to benefit patients in need of dedicated bed support.

That is, while a practitioner may have need of an easily adjustable bed such as is provided by the use of cams, a patient, once diagnosed, may not require a variable height bed implemented by cams, but may simply require a variable height bed implemented by blocks, the blocks being set to heights  
5 determined by the practitioner using a cam adjustable bed.

Referring now to Figure 3 a plan view of the invention is shown where the support base has a rectangular housing 1 and a plurality of slats 2 running transversely across the base over the whole length of the housing. The particular embodiment shown in Figure 3 has slats provided for each  
10 side of the base which are individually adjustable from side to side and along the length thereof. Such individual adjustment allows complete tuning of the macro support for each side of a mattress placed on top thereof.

Each slat has a cam 4 positioned at either end connected and operated via an axle 5. The slats may be divided into two separate sides 6 and 7 to  
15 provide for independent adjustment for each user. The slats have a cam 4 at either end to provide the variable height support which can be adjusted by rotating the axle 5 which protrudes to the exterior of the housing 1. The external protrusions 8 allow ready adjustment of the height of the individual slats.

20 Referring now to Figures 4 and 5 an alternative embodiment of the invention is shown where the supporting slats 2 are individually adjustable and supported by an elongate cam 4 which can be eccentrically pivoted about the axle 5. Such elongate cams provide a simplified operating mechanism and ensure uniform adjustment of each slat along its length.

25 An extension of the previously detailed aspect of the invention may be provided as shown in Figure 5 where the elongate adjustable cams 4 provide support for the mattress directly without the need for riding slats. Such an embodiment will depend on suitably dimensioned cams 4 or alternatively a sufficient number of cams closely placed together so as to provide adequate  
30 point support for said mattress.

Figure 6 details another embodiment of the invention where the support base is in the form of a folding unit having a section pivotal for raising so as to support the user in a partially elevated position. Such a support base would be particularly suitable for hospital or invalid applications where the user requires elevation in a variety of positions. Such currently available units however suffer from the inability to provide adequate lumbar support and the invention provides features allowing such deficiencies to be directly and efficiently addressed. The raiseable portion of the mattress support 9 may be provided with one or more cams 4 which can be either elongate and/or cooperate with a slat. In the example where the cams are elongate, and function without a slat, they may be used in place of slats over that given region and operate to push the mattress 3 in or out in accordance with the user's requirements. The elongate cams 4 may be shaped to function as a cam or alternatively, may be in the form of cylinders with eccentrically mounted axles 5. In this manner, the features of the invention can be applied over a limited area of a support base to provide specific adjustment features to a particular region which can be adjusted readily and in accordance with the user's requirements.

The support base of the invention provides for the first time, a fully adjustable and variable macro support for a bed mattress. In particular, embodiments of the invention utilising cams may provide the ability to adjust and tailor the heights of individual slats of the support base whilst the mattress is in situ and indeed the slats can be adjusted whilst the occupant is lying on the fully configured bed.

The slats can be either totally independent in their adjustment or if desirable some slats could be interconnected to speed up and/or coordinate the adjustment regime of a given bed.

In use the support base of the invention would be used in conjunction with a suitable mattress and the profile of the user would allow either a professional orthopaedic adviser or an informed user to adjust the macro support for the mattress so as to provide the necessary differentiation



required over the length of the mattress in order to properly and correctly provide the necessary orthopaedic support for each individual user. The ease and confidence with which the support base of the invention can be adjusted allows the user to make various adjustments if and when required, and the

5 infinite adjustment available by way of the operating cams and fine adjustment available by way of height adjustment blocks allow complete variation as would be required by any user. The adjusting handles could be provided with optional reference readings and calibration to allow

quantitative adjustment of the macro support for a mattress so as to assist the

10 user or practitioner to obtain the ideal support required. Such quantitative adjustment facilities of the support base of the current invention would also allow professional advisers to conduct assessments of individual patients and provide recommendations for the patient to make adjustments to the support base in accordance with their medical requirements without the need for

15 attending the user's bedside.

It will be appreciated by persons skilled in the art that numerous variations and/or modifications may be made to the invention as shown in the specific embodiments without departing from the spirit or scope of the invention as broadly described. The present embodiments are, therefore, to

20 be considered in all respects as illustrative and not restrictive.

Claims:

1. A support base for a bed mattress including a housing having a plurality of transverse slats for supporting said mattress wherein one or more  
5 of said slats are individually adjustable relative to said housing to provide calibrated positive or negative height adjustment for each slat, characterized in that said height adjustment is provided by a means which is operable external to said housing.
2. A support base according to claim 1 wherein said height adjustment  
10 means are cams fitted to said housing for rotational movement and co-operation with said slats to impart a vertical height adjustment to said slats.
3. A support base according to claim 2 wherein said cams are operated in pairs with one cam positioned at or near each end of said slats and wherein said cam pairs are operated simultaneously.
- 15 4. A support base according to any one of claims 1 to 3 wherein said calibration indicates the height of said slats relative to said housing.
5. A support base according to any one of claims 2 to 4 wherein said cam pairs are fitted to a common axle which can be accessed from outside said housing.
- 20 6. A support base according to any one of claims 2 to 5 wherein said cams extend the length of each individual slat.
7. A support base for a bed mattress including a housing having a plurality of transverse elongate cams for supporting said mattress and an adjustment means for said cams wherein one or more said cams are  
25 individually adjustable relative to said housing to provide calibrated positive or negative height adjustment for said mattress.
8. A support base according to claim 7 wherein said cams are operable external to said housing.
9. A support base according to claim 1 wherein said height adjustment  
30 means are height adjusting blocks supporting said individually adjustable slats to impart a vertical height adjustment to said slats.
10. A support base according to claim 9 wherein said height adjusting blocks are calibrated to a height adjustment scale shared by other means for height adjustment.

11. A support base according to any one of claims 1 to 10, wherein said adjustable slats enable height adjustment for more than one user position of said bed mattress.
12. A support base according to any one of claims 1 to 11 wherein said  
5 housing has a hinged portion for raising to support the user in a partially upright position wherein the raiseable portion of said housing incorporates one or more transverse slats or transverse elongate cams for supporting said mattress wherein said slats or cams are individually adjustable relative to  
10 said housing to provide local adjustment of said mattress wherein said adjustment is provided by means which are operable external to said housing.
13. A support base according to any one of claims 1 to 12 substantially as hereinbefore described with particular reference to the figures.

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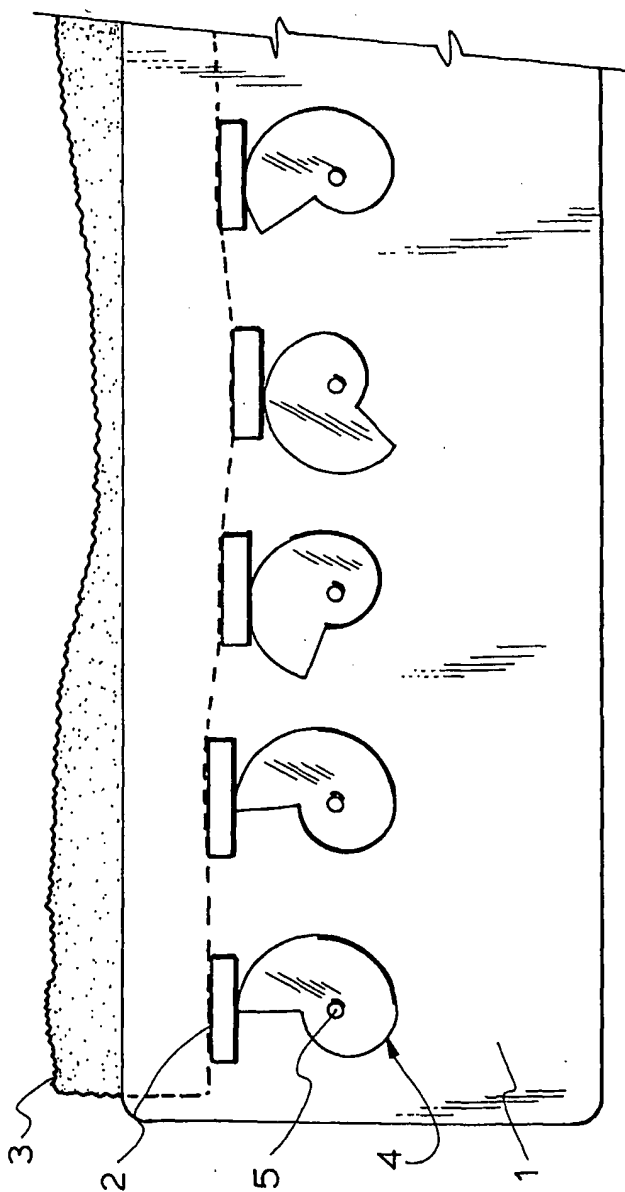
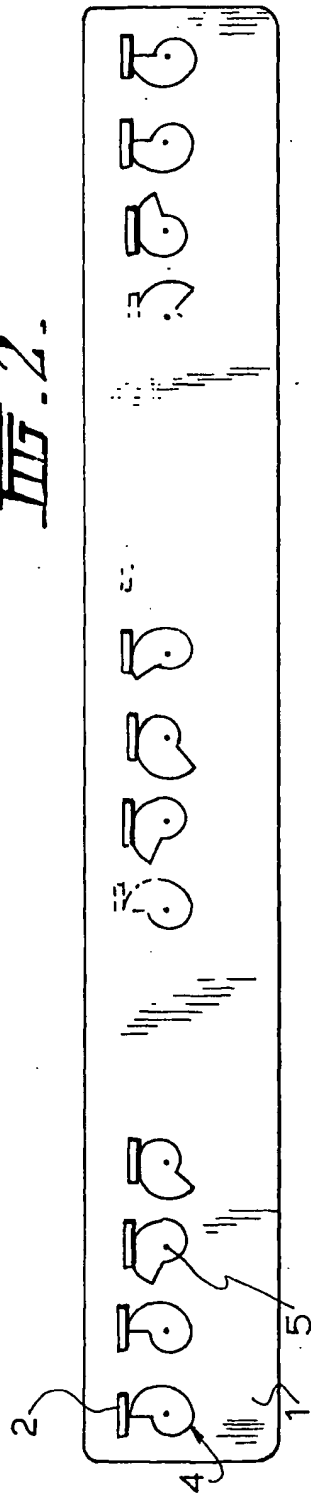


FIG. 1.

FIG. 2.



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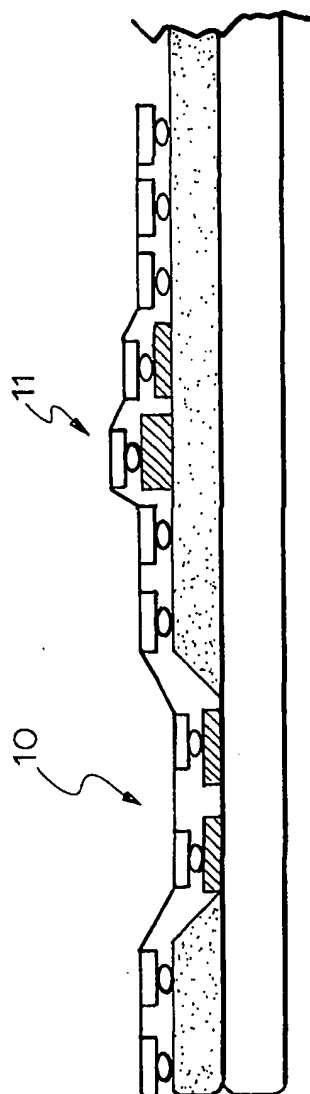


FIG. 2A

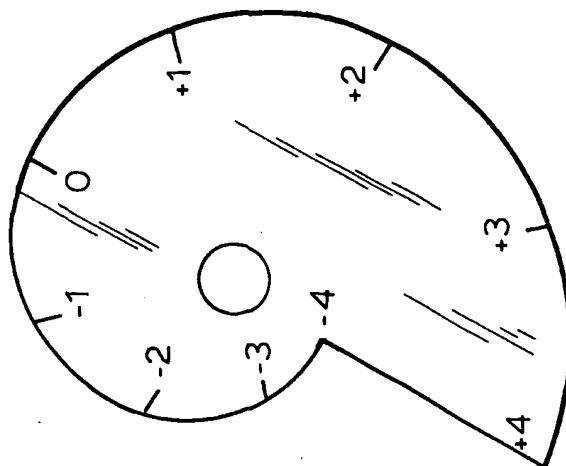
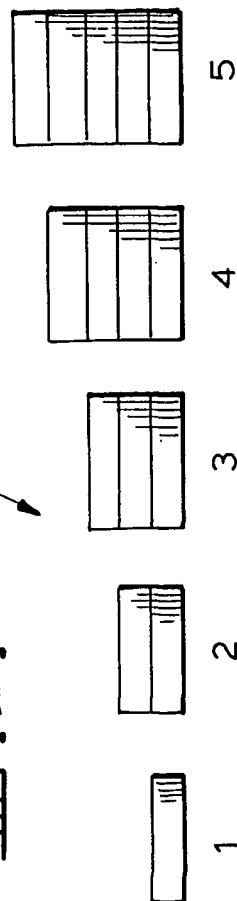
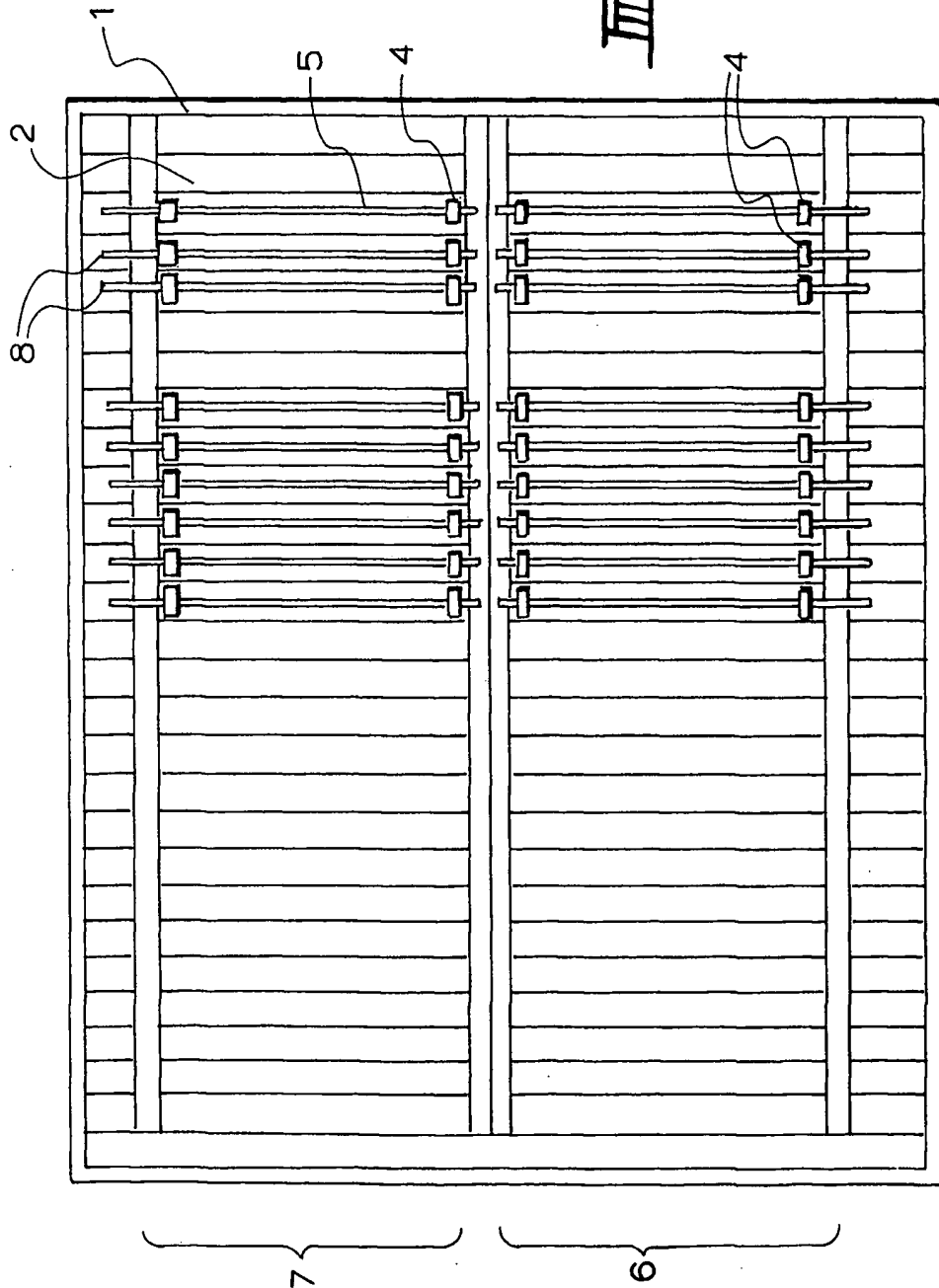


FIG. 2B



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Fig. 3.



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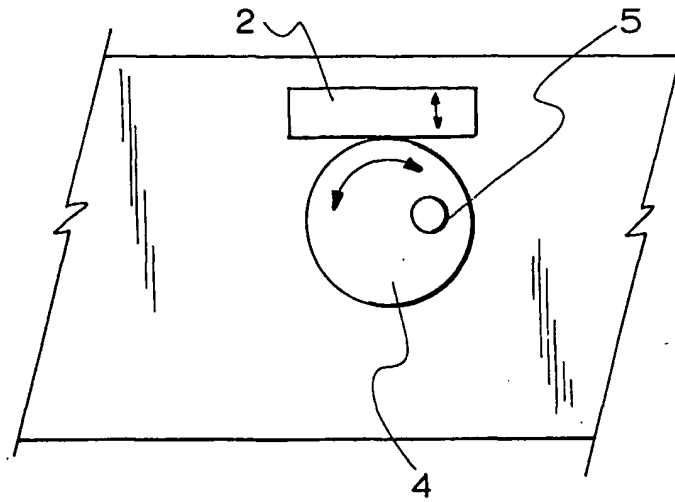


FIG. 4.

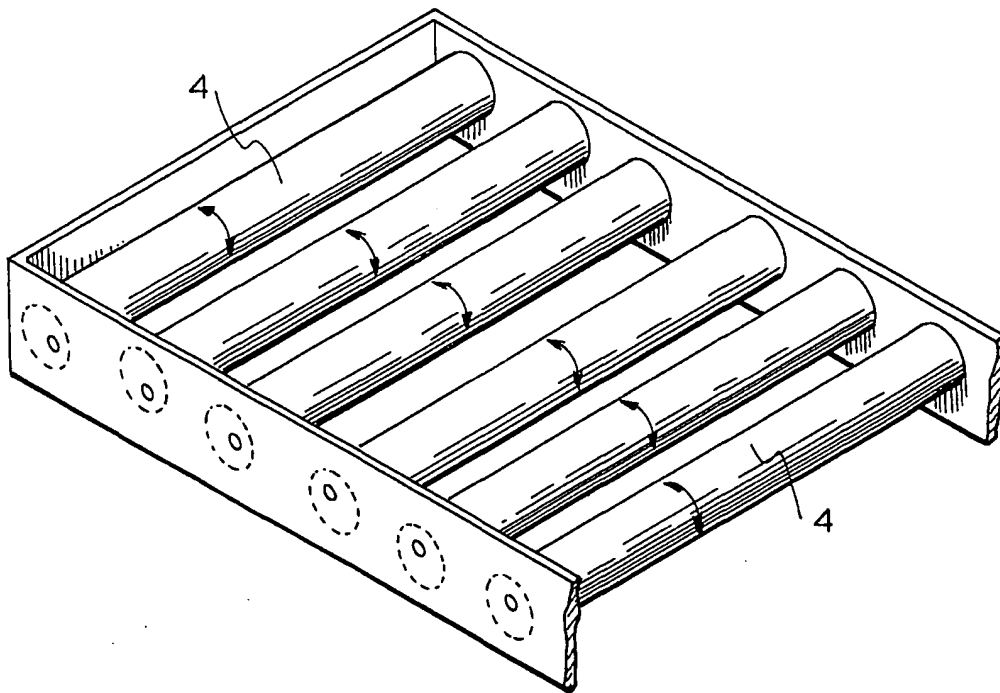
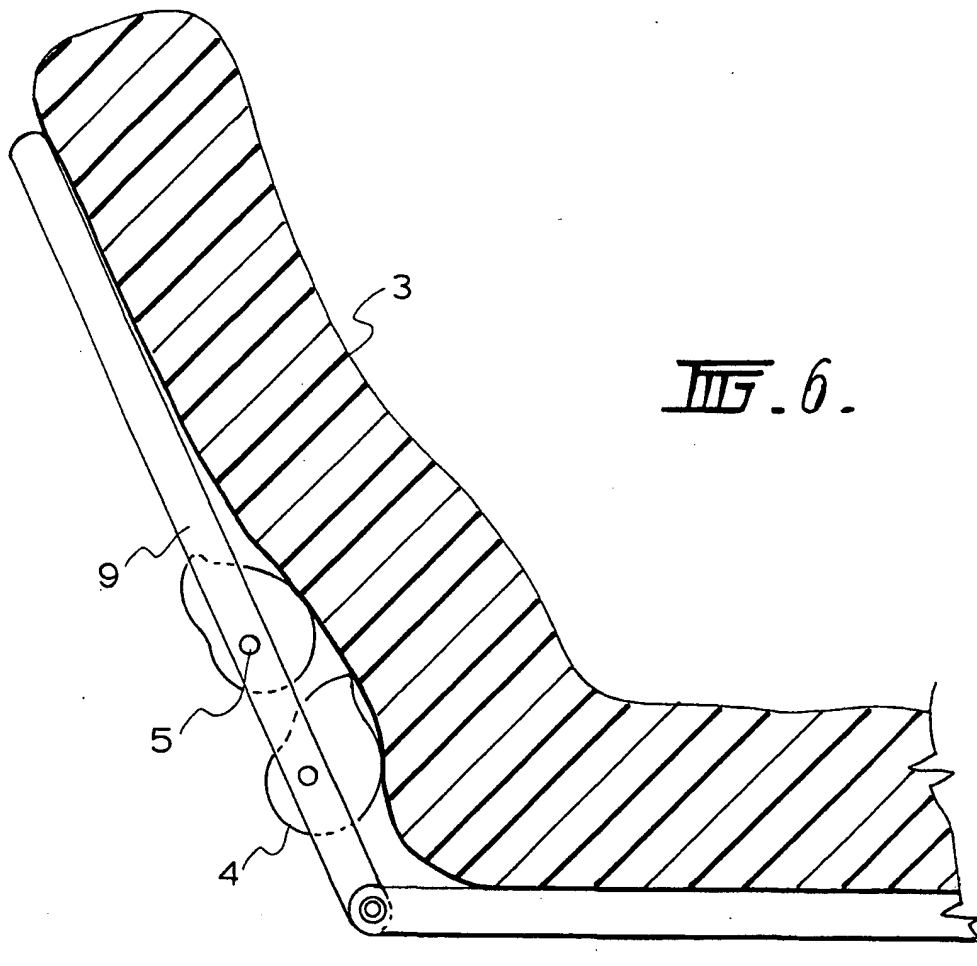


FIG. 5.

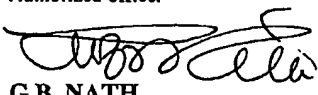
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## INTERNATIONAL SEARCH REPORT

 International application No.  
 PCT/AU 01/01046

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int Cl <sup>7</sup> : A47C 19/00, 19/02, 31/12 A61G 7/015 7/057		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) IPC: A47C 19/00, 19/02, 23/-, 31/12		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched US Class: 5/131, 5/236.1, 5/244		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) WPAT: IPC:Class as above + key words (CAM, SLAT,ADJUST,VARY,ALTER) IFIPAT: US class as above + key words.		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, Y A	EP374742A (D1 BLASI,ROSARIO), 27 June 1990 figures	1,4, 11-12 2-3, 5-10
X Y A	EP 103807 A (HOLLMANN), 28 March 1984 Figures	1,4,11 12 2-3, 5-10
X, Y A	EP337828A (TRACE SARL), 18 OCTOBER 1989 figures	1,4, 11 12 2-3, 5-10, 12
<input checked="" type="checkbox"/> Further documents are listed in the continuation of Box C <input checked="" type="checkbox"/> See patent family annex		
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Date of the actual completion of the international search 03 October 2001		Date of mailing of the international search report 15 OCT 2001
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International application No.

PCT/AU 01/01046

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	FR 2662063A (THIBAUDEAU), 22 NOVEMBER 1991 Figures	1,4 11 12 2-3, 5-10
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# INTERNATIONAL SEARCH REPORT

## Information on patent family members

International application No.  
PCT/AU 01/01046

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
EP	374742	AU	47184/89	CA	2005274	IT	1227726
		JP	2213347	US	5109558		
EP	103807	NONE					
EP	337828	FR	2628620				
FR	2662063	NONE					
DE	4442719	IT	BS		940058		
GB	2117234	AU	12890/83	NZ	203643	US	4494260
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